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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/618,420	07/18/2000	Frank B. Schmuck	POU9-2000-0091-US1	9428

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EXAMINER

MCLEAN MAYO, KIMBERLY N

ART UNIT	PAPER NUMBER
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2187

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/618,420	Applicant(s) SCHMUCK ET AL.	
	Examiner Kimberly N. McLean-Mayo	Art Unit 2187	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2005.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 17-36, 38-44, 47-63 and 65-69 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 18, 39 and 66 is/are allowed.
- 6) ☒ Claim(s) 1-15, 17, 19-33, 35, 36, 38, 40-44, 47-60, 62, 63, 65, 67 and 69 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The enclosed detailed action is in response to the Amendment submitted on March 25, 2005.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-15, 17, 19-33, 35-36, 38, 40-44, 47-60, 62-63, 65, 67 and 69 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The aforementioned claims incorporate the feature "automatically initiating prefetch of data of a plurality of files, in response to the detecting, wherein the automatically initiating is absent a disruption of access to data by applications". There is no support for this limitation in the original specification and thus such is new matter.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 9, 14, 22-24, 30, 43-44, 49-51 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada et al. (USPN: 6,442,682) in view of Hill et al. (USPN: 6,484,239).

Regarding claims 1, 9, 12, 14-15, 22, 30, 33, 35-36, 49, 57, 60 and 62-63, Pothapragada discloses detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes (C 3, L 12-17; L 62-67) of the multiple files (the system determines that a pattern of requests [a sequential pattern of requests] for data of multiple files will occur when the user defined attributes/options/data characteristic indicate that the data/files have been read in a continuous read operation); and prefetching data of a plurality of files in response to the detecting indicating the pattern (C 8, L 9-22)(w.r.t claims 9, 30 and 57 – the data is prefetched at a rate substantial to the speed of requests for data [the speed of request is the speed of requests from a group of instructions accessing data having a detected pattern])).

Additionally, regarding claim 49, hardware systems/devices comprise software/firmware [such as device drivers, etc.] to control its operations and thus it is evident that Pothapragada's system comprises a computer readable medium containing executable instructions for performing the above features (C 12, L 65-67; C 13, L 1-7). Pothapragada does not disclose automatically initiating prefetch of data of a plurality of files in response to the detecting, wherein the automatically initiating is absent a disruption of access to data by applications and wherein the determining whether a pattern of requests exist is performed repeatedly and wherein no prefetching occurs when it is determined that the pattern of requests does not exist. However, Hill teaches the concept of automatically initiating prefetch of data in response to detecting a

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pattern of request for data, wherein the automatically initiating is absent a disruption of access to data by applications (C 3, L 39-67; C 4, L 1-17) and wherein the determining whether a pattern of requests exist is performed repeatedly and wherein no prefetching occurs when it is determined that the pattern of requests does not exist (C 3, L 39-67; C 4, L 1-17). This feature taught by Hill improves the performance of the system by allowing other operations to perform parallel with the prefetching operations. In Pothapragada's system, the system is rebooted to initiate prefetching which prevents operations from processing. One of ordinary skill in the art would have recognized this shortcoming in Pothapragada's system and would have been motivated to incorporate the teachings of Hill with the teachings of Pothapragada for the desired purpose of improved performance.

Regarding claims 2, 23 and 50, Pothapragada discloses the data comprising meta-data (C 5, L 18-21; Pothapragada discloses detecting meta-data operations and thus it is evident that the data comprises meta-data).

Regarding claims 3, 24 and 51, Pothapragada discloses the multiple files and the plurality of files within a single directory (C 8, L 11-14).

Regarding claims 43-44, Pothapragada discloses a first node [logic in the system which performs the detecting function] detecting a pattern of requests for data of multiple files [the multiple files corresponds to the files in which the data elements belong to] and a second node [logic in the

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system which performs the prefetching function] to initiate prefetching data of a plurality of files, in response to the detecting indicating the pattern (C 3, L 12-17; L 62-67; C 8, L 9-22).

Pothapragada does not disclose automatically initiating prefetch of data of a plurality of files in response to the detecting, wherein the automatically initiating is absent a disruption of access to data by applications. However, Hill teaches the concept of automatically initiating prefetch of data in response to detecting a pattern of request for data, wherein the automatically initiating is absent a disruption of access to data by applications (C 3, L 39-67; C 4, L 1-17). This feature taught by Hill improves the performance of the system by allowing other operations to perform parallel with the prefetching operations. In Pothapragada's system, the system is rebooted to initiate prefetching which prevents operations from processing. One of ordinary skill in the art would have recognized this shortcoming in Pothapragada's system and would have been motivated to incorporate the teachings of Hill with the teachings of Pothapragada for the desired purpose of improved performance.

6. Claims 4-5, 25-26 and 52-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada (USPN: 6,442,682) and Hill (USPN: 6,484,239) as applied to claims 1, 22 and 49 above and further in view of Kahle (USPN: 6,574,712).

Pothapragada and Hill disclose the limitations cited above for claims 1, 22 and 49, however, Pothapragada and Hill do not disclose determining whether a cache miss threshold has been exceeded [whether a predefined number of requests for data could not be satisfied by reading [accessing] the cache], wherein the detecting indicates the pattern when the cache miss threshold has been exceeded. However, Kahle teaches the concept of determining whether a cache miss

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threshold has been exceeded (two cache misses), wherein the detecting [detecting a stream pattern] indicates the pattern [the stream pattern] when the cache miss threshold has been exceeded (C 8, L 56-58; C 6, L 53-60; C 8, L 35-55). Kahle teaches that this feature paces the prefetches to work optimally on hardware with a given set of memory latencies (C 8, L 46-50), which thereby improves the performance of the system. The system taught by Pothapragada and Hill do not disclose prefetching based on cache misses and thus could stand improvement [improving hit rate based on cache misses] based on the teachings of Kahle. Hence, it would have been obvious to one of ordinary skill in the art to use Kahle's teachings with the system taught by Pothapragada and Hill for the desirable purpose of improved performance.

7. Claims 6-7, 27-28 and 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada (USPN: 6,442,682), Hill (USPN: 6,484,239) and Kahle (USPN: 6,574,712) as applied to claims 5, 26 and 53 and further in view of Ryan (USPN: 5,367,656).

Pothapragada, Hill and Kahle disclose the above cited features, however, Pothapragada, Hill and Kahle do not disclose the determining step comprising comparing a counter of cache misses that occurred within a preselected time interval to the cache miss threshold to determine whether the cache miss threshold has been exceeded, wherein the counter and the cache miss threshold are associated with a directory block of a directory of files, the directory of files comprising the multiple and plurality of files and the directory of files comprising one or more directory.

However, Ryan teaches the concept of comparing a counter of events that occurred within a preselected time interval to a threshold to determine whether the threshold has been exceeded (C 7, L 50-68; C 8, L 1-46), wherein the counter and the cache miss threshold are associated with a

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directory block of a directory of files [the system directory], the directory of files comprising the multiple and plurality of files and the directory of files comprising one or more directory (the system inherently comprises a page table/translation table [directory] for the main memory, which comprises all the files in the system). This feature taught by Ryan provides a simple and efficient mechanism for determining when a threshold has been exceeded. Thus it would have been obvious to one of ordinary skill in the art to use Ryan's teachings in the system taught by Pothapragada, Hill and Kahle for determining when the cache miss threshold has been exceeded for the desirable purpose of efficiency and simplicity.

8. Claims 8, 29 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada (USPN: 6,442,682) and Hill (USPN: 6,484,239) in view of Lopez-Aguado et al. (USPN: 6,317,810).

Pothapragada and Hill disclose the limitations cited above in claims 1, 22 and 49, however, Pothapragada and Hill do not disclose prefetching data of at least some files of the plurality of files in parallel. Lopez-Aguado teaches the concept of prefetching data in parallel (C 8, L 16-37). Lopez-Aguado teaches that this feature improves data bandwidth (C 9, L 23-24). Hence, it would have been obvious to one of ordinary skill in the art to use Lopez-Aguado's teachings with the teachings of Pothapragada and Hill for the desirable purpose of improved performance and increased bandwidth.

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9. Claims 10, 31 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada (USPN: 6,442,682) and Hill (USPN: 6,484,239) in view of Ryan (USPN: 5,367,656).

Pothapragada and Hill disclose the limitation cited above in claim 1, 22 and 49, additionally Pothapragada discloses obtaining data associated with a number of files of the plurality of files (C 8, L 9-22 - the data is obtained when the data is prefetched). However, Pothapragada does not disclose determining whether a cache hit threshold has been reached and obtaining data associated with one or more additional files of the plurality of files in response to the cache hit threshold. Ryan teaches the concept of determining whether a cache hit threshold has been reached and obtaining data associated with one or more additional files of the plurality of files (files corresponding to the prefetched data) in response to the cache hit threshold (C 7, L 8-12, L 50-68; C 8, entire; C 9, L 1-7; C 3, L 60-68; C 4, L 1-44). This feature taught by Ryan allows the system to adapt to ratio improving and ratio deteriorating trends by accordingly enabling and disabling the prefetching mechanism [cache miss prediction mechanism] (C 2, L 58-63) and thereby provides flexibility and improved performance to the system. Pothapragada's system performs prefetching in the same manner all the time and does not selectively prefetch based on certain thresholds which does not allow the system to adapt its prefetching functionality optimally to meet the dynamic needs of the system and thus one of ordinary skill would have recognized the benefits of Ryan's teachings and would have been motivated to use Ryan's teachings in the system taught by Pothapragada and Hill for the desirable purpose of flexibility and improved performance.

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10. Claims 11, 32 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada (USPN: 6,442,682), Hill (USPN: 6,484,239) and Ryan (USPN: 5,367,656) as applied to claims 10, 31 and 58 above and further in view of Lopez-Aguado (USPN: 6,317,810). Regarding claims 11, 32 and 59, Pothapragada, Hill and Ryan do not explicitly disclose issuing a plurality of requests to read data from a number of files in parallel. However, Lopez-Aguado teaches the concept of issuing a plurality of request [prefetch request] to read [prefetch] data in parallel (C 8, L 16-37). Lopez-Aguado teaches that this feature improves data bandwidth (C 9, L 23-24). Hence, it would have been obvious to one of ordinary skill in the art to use Lopez-Aguado's teachings with the system taught by Pothapragada, Hill and Ryan for the desirable purpose of improved performance and increased bandwidth.

11. Claims 17, 20, 38, 41, 47-48, 65 and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada (USPN: 6,442,682) in view of Hill (USPN: 6,484,239). Regarding claims 17, 20, 38, 41, 47-48, 65 and 68, Pothapragada discloses detecting (by a first node comprising the logic to execute this functionality) a pattern of requests for multiple inodes associated with multiple files of a directory block of the one or more directory blocks, wherein the pattern is based on directory entries of the multiple files being within the directory block of the multiple files (C 5, L 20- 23; C 7, L 44- the system determines that a pattern of requests for multiple inodes associated with multiple files of a directory block of the one or more directory blocks will occur when the user defined attributes/options/data characteristic indicate that the accessed data/files have been primarily metadata input/output operations). Pothapragada does not disclose prefetching a plurality of inodes associated with the directory block in response to the

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detecting the pattern. However, Pothapragada discloses prefetching (via a second node comprising logic to execute the prefetching functionality) generally (Figure 6) which improves the performance of the system by retrieving data from slow memory before it is accessed so that the access time of the data is improved. Pothapragada discloses storing the metadata (inode) information in a cache and innately the data included in a cache line which has not been accessed is effectively prefetched. Thus, it would have been obvious to one of ordinary skill in the art to modify Pothapragada's system such that a plurality of inodes associated with the directory block is prefetched in response to the detecting the pattern for the desirable purpose of improved performance. Additionally, Pothapragada does not disclose automatically initiating prefetch of data of a plurality of files in response to the detecting, wherein the automatically initiating is absent a disruption of access to data by applications and wherein the determining whether a pattern of requests exist is performed repeatedly and wherein no prefetching occurs when it is determined that the pattern of requests does not exist. However, Hill teaches the concept of automatically initiating prefetch of data in response to detecting a pattern of request for data, wherein the automatically initiating is absent a disruption of access to data by applications (C 3, L 39-67; C 4, L 1-17) and wherein the determining whether a pattern of requests exist is performed repeatedly and wherein no prefetching occurs when it is determined that the pattern of requests does not exist (C 3, L 39-67; C 4, L 1-17). This feature taught by Hill improves the performance of the system by allowing other operations to perform parallel with the prefetching operations. In Pothapragada's system, the system is rebooted to initiate prefetching which prevents operations from processing. One of ordinary skill in the art would have recognized this shortcoming in Pothapragada's system and would have been motivated to incorporate the

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teachings of Hill with the teachings of Pothapragada for the desired purpose of improved performance.

Regarding claim 65, hardware systems/devices comprise software/firmware [such as device drivers, etc.] to control its operations and thus it is evident that Pothapragada's system comprises a computer readable medium containing executable instructions for performing the above features.

12. Claims 19, 40 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada (USPN: 5,829,031) and Hill (USPN: 6,484,239) as applied to claims 17, 38 and 65 above and further in view of Lopez-Aguado et al. (USPN: 6,317,810).

Pothapragada and Hill disclose the limitations cited above in claims 17, 38 and 65, however, Pothapragada and Hill do not disclose prefetching a portion of the plurality of inodes [data] in parallel. Lopez-Aguado teaches the concept of prefetching data in parallel (C 8, L 16-37). Lopez-Aguado teaches that this feature improves data bandwidth (C 9, L 23-24). Hence, it would have been obvious to one of ordinary skill in the art to use Lopez-Aguado's teachings with the teachings of Pothapragada and Hill for the desirable purpose of improved performance and increased bandwidth.

13. Claims 21, 42 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pothapragada (USPN: 6,442,682) and Hill (USPN: 6,484,239) as applied to claims 20, 41 and 65 and further in view of Ryan (USPN: 5,367,656).

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Pothapragada and Hill disclose the limitation cited above in claims 20, 41 and 68, however, Pothapragada and Hill do not disclose determining whether a cache hit threshold has been reached, wherein prefetching one or more inodes of data associated with another directory block is initiated when the cache hit threshold is reached. Ryan teaches the concept of determining whether a cache hit threshold has been reached and obtaining data associated with one or more additional files in response to the cache hit threshold (C 7, L 8-12, L 50-68; C 8, entire; C 9, L 1-7; C 3, L 60-68; C 4, L 1-44). This feature taught by Ryan allows the system to adapt to ratio improving and ratio deteriorating trends by accordingly enabling and disabling the prefetching mechanism [cache miss prediction mechanism] (C 2, L 58-63) and thereby provides flexibility and improved performance to the system. The system taught by Pothapragada performs prefetching in the same manner all the time and does not selectively prefetch based on certain thresholds which does not allow the system to adapt its prefetching functionality optimally to meet the dynamic needs of the system and thus one of ordinary skill would have recognized the benefits of Ryan's teachings and would have been motivated to use Ryan's teachings in the system taught by Pothapragada and Hill for the desirable purpose of flexibility and improved performance.

Allowable Subject Matter

14. Claims 18, 39 and 66 are allowed.
15. Claims 13, 34, 61 and 68 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the

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base claim and any intervening claims and to overcome the above indicated 35 USC 112 rejection.

Response to Arguments

16. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

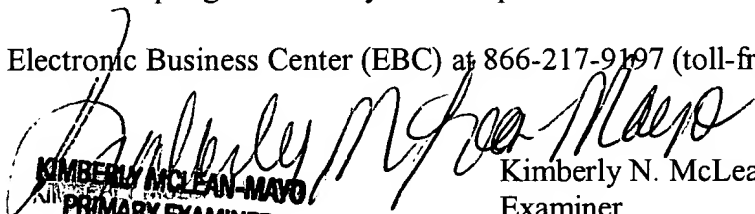
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then, the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly N. McLean-Mayo whose telephone number is 703-308-9592. The examiner can normally be reached on Tues, Thr, Fri (10:00 - 6:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 703-308-1756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


KIMBERLY MCLEAN-MAYO
PRIMARY EXAMINER
Kimberly N. McLean-Mayo
Examiner
Art Unit 2187

KNM

June 13, 2005